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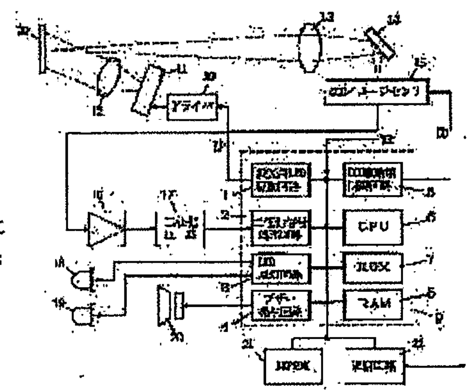
(54) BAR CODE READER

(57)Abstract:
PURPOSE: To provide a bar code reader which can read bar code information out in the best operation state according to the use state.
CONSTITUTION: A set value of a frequency of scanning and a set value of LED illumination pulse width are written in as set value table in advance through a user setting process, and saved in an EEPROM 21. Before measurement is started, a CPU 6 reads the values out of the set value table in the EEPROM 21 and a CCD driving control circuit 5 drives a CCD image sensor 15 at maximum operation frequency. After the measurement is started, a projection LED driving circuit 9 turns on an LED array 11 according to the set value of the LED illumination pulse width and the CCD driving control circuit 5 varies output intervals of a CCD driving control signal CD according to the set value of the frequency of scanning.



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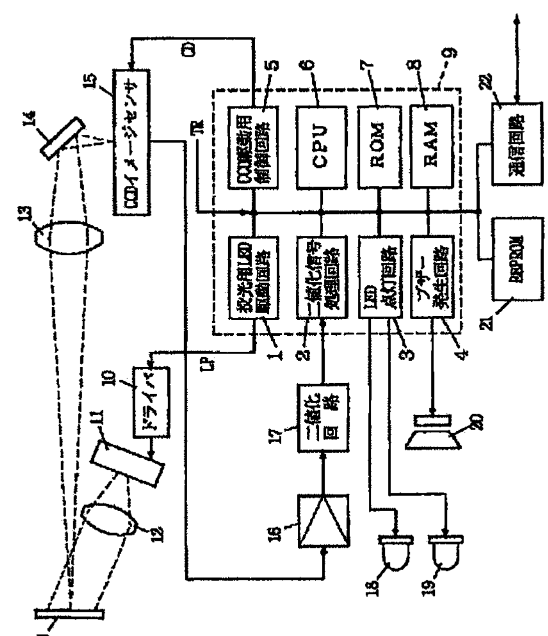
(54)【発明の名称】　バーコード読取装置

(57)【要約】

【目的】　使用状況に応じて最良の動作状態でバーコード情報を読み取ることができるバーコード読取装置を提供することである。

【構成】　予めユーザ設定処理により走査回数の設定値およびＬＥＤ点灯パルス幅の設定値を設定値テーブルに書き込み、ＥＥＰＲＯＭ２１に保存する。測定開始前に、ＣＰＵ６はＥＥＰＲＯＭ２１から設定値テーブルの値を読み込み、ＣＣＤ駆動用制御回路５はＣＣＤイメージセンサ１５を最大動作周波数で駆動する。測定開始後は、投光用ＬＥＤ駆動回路９がＬＥＤアレイ１１をＬＥＤ点灯パルス幅の設定値に応じて点灯させ、ＣＣＤ駆動用制御回路５がＣＣＤ駆動制御信号ＣＤの出力間隔を走査回数の設定値に応じて変更する。



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【特許請求の範囲】

【請求項１】　読取対象となるバーコードに光を照射する投光手段と、
前記投光手段により光が照射されたバーコードからの反射光を受光して電気信号に変換する撮像素子と、
前記撮像素子から出力される電気信号を二値化データに変換する二値化手段と、
前記二値化手段により得られた二値化データを解析してバーコード情報を読み取る解析手段と、
前記撮像素子の動作周波数を予め任意に設定する動作周波数設定手段と、
前記動作周波数設定手段により設定された動作周波数で前記撮像素子を駆動する制御手段とを備えたことを特徴とするバーコード読取装置。

【請求項２】　読取対象となるバーコードに光を照射する投光手段と、
前記投光手段により光が照射されたバーコードからの反射光を受光して電気信号に変換する撮像素子と、
前記撮像素子から出力される電気信号を二値化データに変換する二値化手段と、
前記二値化手段により得られた二値化データを解析してバーコード情報を読み取る解析手段と、
前記撮像素子の第１の動作周波数を予め任意に設定する動作周波数設定手段と、
測定前に前記撮像素子を前記第１の動作周波数以上の所定の第２の動作周波数で駆動し、測定開始後に前記撮像素子の動作周波数を前記動作周波数設定手段により設定された前記第１の動作周波数に切り替える制御手段とを備えたことを特徴とするバーコード読取装置。

【請求項３】　読取対象となるバーコードに光を照射する投光手段と、
前記投光手段により光が照射されたバーコードからの反射光を受光して電気信号に変換する撮像素子と、
前記撮像素子から出力される電気信号を二値化データに変換する二値化手段と、
前記二値化手段により得られた二値化データを解析してバーコード情報を読み取る解析手段と、
前記投光手段による光照射の時間を予め任意に設定する照射時間設定手段と、
前記撮像素子、前記二値化手段および前記解析手段による読取動作を繰り返し行うとともに、各読取動作ごとに、前記照射時間設定手段により設定された時間の間、前記投光手段による光照射を行う制御手段とを備えたことを特徴とするバーコード読取装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は撮像素子（イメージセンサ）を用いたバーコード読取装置に関する。

【０００２】

【従来の技術】撮像素子を用いたバーコード読取装置では、たとえばＬＥＤ（発光ダイオード）アレイにより測定対象となるバーコードの一端から他端に渡って光を同時に照射し、その反射光をたとえばＣＣＤ（電荷結合素子）イメージセンサにより同時に受光して電気信号に変換し、その電気信号を数値化して解析することによりバーコード情報を読み取る。このような読取動作を、所定の終了条件が満たされるまで繰り返し行う。以下、１回の読出動作を１走査と呼ぶ。

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【０００３】読取動作の周波数（単位時間当たりの走査回数）が高いほど処理速度は速くなる。その反面、バーコードが撮像素子に結像される時間は単位時間当たりの走査回数に反比例するので、単位時間当たりの走査回数が多くなるほど各走査ごとに得られる受光量が少なくなり、読取率（読取動作の回数に対する読み取りができた回数の割合）が低くなる。この単位時間当たりの走査回数は、各バーコード読取装置のハードウエア構成により固定的に定められている。

【０００４】

【発明が解決しようとする課題】一般的に、撮像素子を用いたバーコード読取装置においては、バーコードの全体に渡って光が同時に照射され、この反射光が所定時間の間受光されるので、測定中にバーコードが移動するとバーコード情報を正確に読み取ることができない。そのため、このようなバーコード読取装置を用いて正確にバーコード情報を読み取るためには、バーコードラベルが付された物体をできるだけ静止させる必要がある。

【０００５】しかしながら、工場の生産ライン等において、移動する物体に付されたバーコードを撮像素子を用いた小型のバーコード読取装置で正確に測定することが要望されている。そこで、バーコードがイメージセンサに結像される時間よりも短い時間幅だけＬＥＤをパルス点灯させることにより移動するバーコードを測定する方法が提案されている。

【０００６】この場合、ＬＥＤの点灯時間が短いほどバーコードの移動の影響が少なくなる。その反面、バーコード上に照射される光の量が少なくなるので読取率が低下する。そこで、ＬＥＤの点灯時間は、各バーコード読取装置の使用目的に応じてハードウエア構成により適当な値に固定的に定められている。

【０００７】しかしながら、測定対象となるバーコードの移動の有無やバーコードの移動速度、測定距離等の使用状況により最良の走査回数およびＬＥＤの点灯時間が異なる。したがって、ユーザが使用状況に応じて最良の動作状態でバーコード情報を読み取れることが望まれている。

【０００８】本発明の目的は、使用状況に応じて最良の動作状態でバーコード情報を読み取ることができるバーコード読取装置を提供することである。

【０００９】

【課題を解決するための手段】

（1） 第1の発明

第1の発明に係るバーコード読取装置は、投光手段、撮像素子、二値化手段、解析手段、動作周波数設定手段および制御手段を備える。

【0010】投光手段は、読取対象となるバーコードに光を照射する。撮像素子は、投光手段により光が照射されたバーコードからの反射光を受光して電気信号に変換する。二値化手段は、撮像素子から出力される電気信号を二値化データに変換する。解析手段は、二値化手段により得られた二値化データを解析してバーコード情報を読み取る。動作周波数設定手段は、撮像素子の動作周波数を予め任意に設定する。制御手段は、動作周波数設定手段により設定された動作周波数で撮像素子を駆動する。

【0011】（2） 第2の発明

第2の発明に係るバーコード読取装置は、投光手段、撮像素子、二値化手段、解析手段、動作周波数設定手段および制御手段を備える。

【0012】投光手段は、読取対象となるバーコードに光を照射する。撮像素子は、投光手段により光が照射されたバーコードからの反射光を受光して電気信号に変換する。二値化手段は、撮像素子から出力される電気信号を二値化データに変換する。解析手段は、二値化手段により得られた二値化データを解析してバーコード情報を読み取る。動作周波数設定手段は、撮像素子の第1の動作周波数を予め任意に設定する。制御手段は、測定前に撮像素子を第1の動作周波数以上の所定の第2の動作周波数で駆動し、測定開始後に撮像素子の動作周波数を動作周波数設定手段により設定された第1の動作周波数に切り替える。

【0013】（3） 第3の発明

第3の発明に係るバーコード読取装置は、投光手段、撮像素子、二値化手段、解析手段、照射時間設定手段および制御手段を備える。

【0014】投光手段は、読取対象となるバーコードに光を照射する。撮像素子は、投光手段により光が照射されたバーコードからの反射光を受光して電気信号に変換する。二値化手段は、撮像素子から出力される電気信号を二値化データに変換する。解析手段は、二値化手段により得られた二値化データを解析してバーコード情報を読み取る。照射時間設定手段は、投光手段による光照射の時間を予め任意に設定する。制御手段は、撮像素子、二値化手段および解析手段による読取動作を繰り返し行うとともに、各読取動作ごとに、照射時間設定手段により設定された時間の間、投光手段による光照射を行う。

【0015】

【作用】第1～第3の発明に係るバーコード読取装置においては、読取対象となるバーコードに光が照射され、その反射光が受光されて電気信号に変換され、さらに電気信号が二値化データに変換される。そして、二値化データが解析されてバーコード情報が読み取られる。この読取動作は、所定の終了条件が満たされるまで繰り返し行われる。

【0016】特に、第1の発明に係るバーコード読取装置においては、撮像素子の動作周波数を動作周波数設定手段によって予め任意に設定することができる。それにより、測定中には、撮像素子が設定された動作周波数で駆動される。したがって、ユーザは、使用状況に応じて最良の動作状態でバーコード情報の読み取りができるように撮像素子の動作周波数を調整することが可能となる。

【0017】また、第2の発明に係るバーコード読取装置においては、撮像素子の第1の動作周波数を動作周波数設定手段によって任意に設定することができるとともに、測定前には撮像素子が第1の動作周波数以上の第2の動作周波数で駆動され、測定開始後には撮像素子の動作周波数が設定された第1の動作周波数に切り替えられる。したがって、ユーザは、使用状況に応じて最良の動作状態でバーコード情報の読み取りができるように撮像素子の動作周波数を調整することが可能になり、かつ測定開始前に撮像素子が高い動作周波数で駆動されているので、測定開始の指令から測定開始までの時間が短くなり、迅速に測定を開始することができる。

【0018】さらに、第3の発明に係るバーコード読取装置においては、投光手段による光照射の時間を照射時間設定手段によって予め任意に設定することができる。これにより、各読取動作ごとに、設定された時間の間バーコードに光が照射される。したがって、ユーザは、使用状況に応じて最良の動作状態でバーコード情報の読み取りができるようにバーコードへの光照射の時間を調整することが可能となる。

【0019】

【実施例】図1は本発明の一実施例によるバーコード読取装置の構成を示すブロック図である。図1において、投光用ＬＥＤ駆動回路1、二値化信号処理回路2、ＬＥＤ点灯回路3、ブザー発生回路4、ＣＣＤ駆動用制御回路5、ＣＰＵ（中央演算処理装置）6、ＲＯＭ（リードオンリメモリ）7およびＲＡＭ（ランダムアクセスメモリ）8は、ワンチップマイクロコンピュータ9により構成される。

【0020】投光用ＬＥＤ駆動回路1は、ドライバ10を介して投光用ＬＥＤアレイ11を駆動する。投光用ＬＥＤアレイ11から出射された光は投光用レンズ12を通してバーコード30に照射される。バーコード30からの反射光は受光用レンズ13を通して鏡14により反射され、ＣＣＤイメージセンサ15により受光される。このＣＣＤイメージセンサ15はＣＣＤ駆動用制御回路5により駆動される。

【0021】ＣＣＤイメージセンサ15は、受光した光を電気信号に変換する。ＣＣＤイメージセンサ15から

出力される電気信号は増幅器１６を介して二値化回路１７に与えられる。二値化回路１７は増幅された電気信号を二値化信号に変換する。二値化回路１７から出力される二値化信号はＤＭＡ（ダイレクトメモリアクセス）等の方法で二値化データとして順次ＲＡＭ８に取り込まれる。二値化信号処理回路２は、ＲＡＭ８に記憶された二値化データを解析（復号）し、バーコード情報を読み取る。

【００２２】ＬＥＤ点灯回路３は、二値化信号処理回路２によるバーコード情報の読取状態を表示するためにＬＥＤ１８，１９を点灯をさせる。ＬＥＤ１８はバーコード情報の読取の有無を表示する。ＬＥＤ１９はバーコード情報の読取の安定性を表示する。ブザー発生回路４は、二値化信号処理回路２によりバーコード情報が読み取られたときにブザー２０を鳴らす。

【００２３】ＣＰＵ６はＲＯＭ７に格納される制御プログラムに従ってワンチップマイクロコンピュータ９内の各部を制御をする。ＥＥＰＲＯＭ（Electrically Erasable and Programmable Read Only Memory; 電気的に消去・書込み可能リードオンリメモリ）２１には、１秒当たりの走査回数（以下、走査回数と略記する）およびＬＥＤ点灯パルス幅の設定値が設定値テーブルとして保存される。通信回路２２は、外部装置から与えられる種々のコマンドを受信してＣＰＵ６に与えるとともに二値化信号処理回路２によるバーコード情報の読取結果を外部装置に送信する。

【００２４】本実施例では、投光用ＬＥＤアレイ１１が投光手段を構成し、ＣＣＤイメージセンサ１５が撮像素子を構成し、二値化回路１７が二値化手段を構成する。また、二値化信号処理回路２が解析手段を構成し、ＥＥＰＲＯＭ２１および通信回路２２が動作周波数設定手段および照射時間設定手段を構成し、投光用ＬＥＤ駆動回路１、ＣＣＤ駆動用制御回路５およびＣＰＵ６が制御手段を構成する。

【００２５】図２は図１のバーコード読取装置における各部の信号波形図である。図２において、読出ゲートパルス信号ＲＧおよびＣＣＤクロック信号ＣＫは、ＣＣＤ駆動制御信号ＣＤとしてＣＣＤ駆動用制御回路５からＣＣＤイメージセンサ１５に与えられる。また、ＬＥＤ点灯パルス信号ＬＰは、投光用ＬＥＤ駆動回路１からドライバ１０を介して投光用ＬＥＤアレイ１１に与えられる。

【００２６】読出ゲートパルス信号ＲＧのパルス間隔が１走査時間となり、ＬＥＤ点灯パルス信号ＬＰのパルス幅が光照射の時間となる。非測定時には、走査回数が最高値に設定され、走査時間Ｓ０が最短時間に固定される。それにより、ＣＣＤイメージセンサ１５が最大動作周波数で駆動される。また、非測定時には、ＬＥＤ点灯パルス信号ＬＰのパルス幅Ｗ０が予め定められた値に固定されている。

【００２７】測定開始用トリガー信号ＴＲが与えられると、読出ゲートパルス信号ＲＧの次のパルスの発生時に測定が開始される。測定時には、読出ゲートパルス信号ＲＧおよびＣＣＤクロック信号ＣＫの走査時間Ｓ１およびＬＥＤ点灯パルス信号ＬＰのパルス幅（ＬＥＤ点灯パルス幅）Ｗ１がそれぞれ設定値に変更される。

【００２８】このように、測定開始前にＣＣＤイメージセンサ１５が最大動作周波数で駆動されているので、トリガー信号ＴＲの入力から測定開始までの時間が最短となり、迅速に測定が開始される。

【００２９】次に、図３のフローチャートを参照しながら本実施例のバーコード読取装置におけるユーザ設定処理を説明する。まず、通信回路２２を介してコマンドが入力されると（ステップＳ１）、ＣＰＵ６は、そのコマンドが走査回数設定コマンドであるか否かを判定する（ステップＳ２）。走査回数設定コマンドの場合には、走査回数設定コマンドとともに通信回路２２を介して入力される走査回数の設定値をＲＡＭ８内の設定値テーブルに書き込む（ステップＳ３）。

【００３０】入力されたコマンドが走査回数設定コマンドでない場合には、そのコマンドがＬＥＤ点灯パルス幅設定コマンドであるか否かを判定する（ステップＳ４）。ＬＥＤ点灯パルス幅設定コマンドの場合には、そのＬＥＤ点灯パルス幅設定コマンドとともに通信回路２２を介して入力されるＬＥＤ点灯パルス幅の設定値をＲＡＭ８内の設定値テーブルに書き込む（ステップＳ５）。

【００３１】入力されたコマンドがＬＥＤ点灯パルス幅設定コマンドでない場合には、そのコマンドがセーブコマンドであるか否かを判定する（ステップＳ６）。セーブコマンドの場合には、ＲＡＭ８内の設定値テーブルの各値をＥＥＰＲＯＭ２１に書き込む（ステップＳ７）。

【００３２】入力されたコマンドがその他のコマンドである場合には（ステップＳ８）、各コマンドに対応する処理を実行する（ステップＳ９）。このようにして、ＥＥＰＲＯＭ２１に走査回数の設定値およびＬＥＤ点灯パルス幅の設定値が設定値テーブルとして保存される。

【００３３】次に、図４のフローチャートを参照しながら本実施例のバーコード読取装置における通常運転の動作を説明する。まず、ＣＰＵ６はＥＥＰＲＯＭ２１から設定値テーブルの値をＲＡＭ８に読み込む（ステップＳ１０）。ＣＣＤ駆動用制御回路５は、ＣＣＤイメージセンサ１５を最大動作周波数で駆動する（ステップＳ１１）。そして、所定の測定開始条件が満たされるまで待機する（ステップＳ１２）。ここで、所定の測定開始条件とはたとえば外部から測定開始用トリガー信号ＴＲが与えられるか通信回路２２を介して測定開始コマンドが与えられることである。

【００３４】測定開始条件が満たされると、ＣＰＵ６はＬＥＤ点灯パルス幅および走査回数の設定値をＲＡＭ８

内の設定値テーブルから読み込む（ステップＳ１３）。それにより、投光用ＬＥＤ駆動回路９が、ドライバ１０を介して投光用ＬＥＤアレイ１１をＬＥＤ点灯パルス幅の設定値に応じて点灯させる（ステップＳ１４）。また、ＣＣＤ駆動用制御回路５が、ＣＣＤ駆動制御信号ＣＤの出力間隔を走査回数の設定値に応じて変更する（ステップＳ１５）。

【００３５】このようにして、所定の測定終了条件が満たされるまで（ステップＳ１６）、ステップＳ１４，Ｓ１５の読取動作を繰り返す。ここで、所定の測定終了条件とは、たとえば２回同じバーコード情報が読み取られたことまたは通信回路２２を介して測定終了コマンドが与えられたことである。

【００３６】このように、本実施例のバーコード読取装置においては、走査回数およびＬＥＤ点灯パルス幅を任意に設定することができるので、ユーザが使用状況に応じて最良の処理速度および最良の読取率でバーコード情報の読み取りができるようにこれらの値を調整することが可能となる。

【００３７】また、測定前にＣＣＤイメージセンサ１５が最大動作周波数で駆動されているので、測定開始用トリガー信号ＴＲが入力されたときに迅速に設定された走査回数およびＬＥＤ点灯パルス幅でバーコード情報の読取動作を開始することができる。

【００３８】さらに、本実施例のバーコード読取装置においては、投光用ＬＥＤ駆動回路１、二値化信号処理回路２、ＬＥＤ点灯回路３、ブザー発生回路４およびＣＣＤ駆動用制御回路５がワンチップマイクロコンピュータ９内に内蔵されているので、小型化が図られる。

【００３９】

【発明の効果】第１の発明によれば、撮像素子の動作周波数を動作周波数設定手段により任意に設定することができるので、使用状況に応じて最良の動作状態でバーコード情報の読み取りを行うことができる。

【００４０】第２の発明によれば、撮像素子の第１の動作周波数を動作周波数設定手段により任意に設定することができ、かつ測定前に撮像素子が第１の動作周波数以上の第２の動作周波数で駆動され、測定開始後に撮像素子の動作周波数が設定された第１の動作周波数に切り替えられるので、ユーザが使用状況に応じて最良の動作状態でバーコード情報の読み取りを行うことができるとともに測定開始の指令から測定開始までの時間が最短となり、迅速にバーコードの測定を開始することができる。

【００４１】第３の発明によれば、バーコードへの光照射の時間を照射時間設定手段により任意に設定することができるので、使用状況に応じて最良の動作状態でバーコード情報の読み取りを行うことができる。

【図面の簡単な説明】

【図１】本発明の一実施例によるバーコード読取装置の構成を示すブロック図である。

【図２】図１のバーコード読取装置における各部の波形図である。

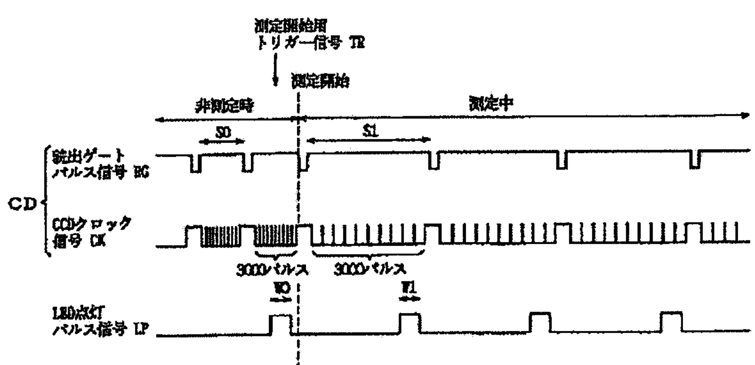
【図３】図１のバーコード読取装置におけるユーザ設定処理を示すフローチャートである。

【図４】図１のバーコード読取装置における通常運転時の動作を示すフローチャートである。

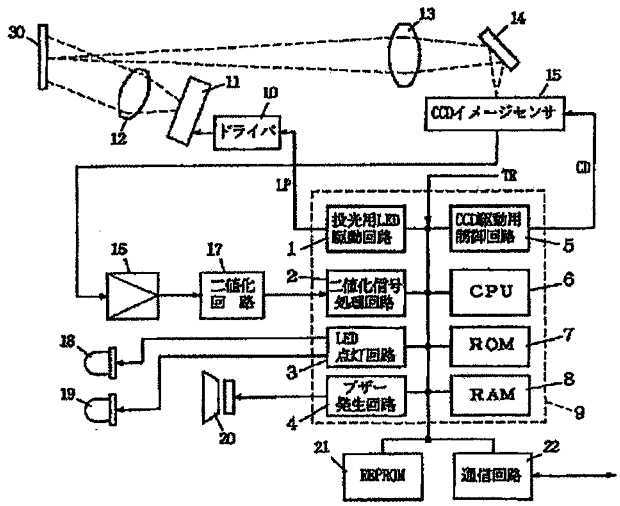
【符号の説明】

１　投光用ＬＥＤ駆動回路
２　二値化信号処理回路
５　ＣＣＤ駆動用制御回路
６　ＣＰＵ
８　ＲＡＭ
９　ワンチップマイクロコンピュータ
１１　ＬＥＤアレイ
１５　ＣＣＤイメージセンサ
１７　二値化回路
２１　ＥＥＰＲＯＭ
２２　通信回路
３０　バーコード

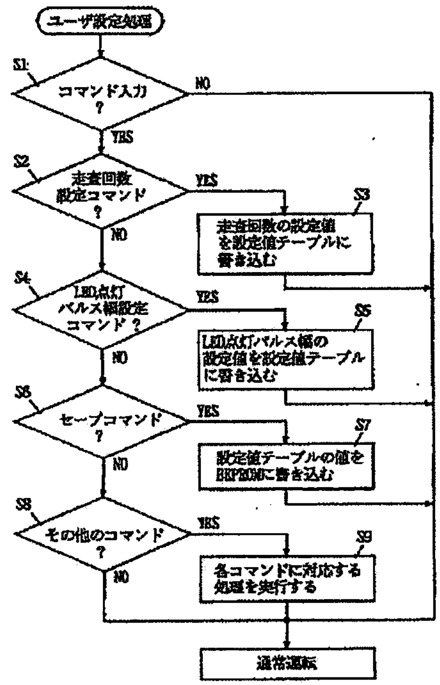
【図２】



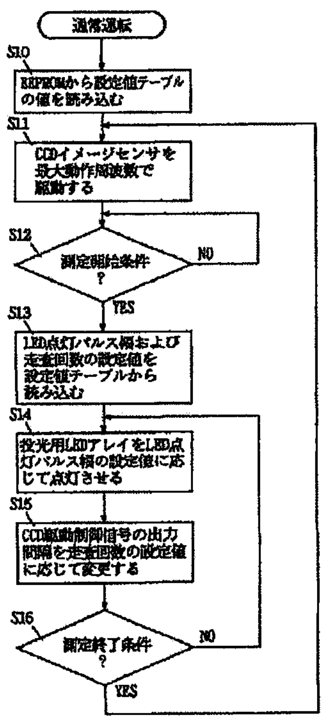
【図１】


ドライバ
CCDイメージセンサ
投光用LED駆動回路
CCD駆動用制御回路
二値化回路
二値化信号処理回路
CPU
LED点灯回路
ROM
ブザー発生回路
RAM
EEPROM
通信回路

【図３】


ユーザ設定処理
コマンド入力？
走査回数設定コマンド？
走査回数の設定値を設定値テーブルに書き込む
LED点灯パルス幅設定コマンド？
LED点灯パルス幅の設定値を設定値テーブルに書き込む
セーブコマンド？
設定値テーブルの値をEEPROMに書き込む
その他のコマンド？
各コマンドに対応する処理を実行する
通常運転

【図４】


通常運転
EEPROMから設定値テーブルの値を読み込む
CCDイメージセンサを最大動作周波数で駆動する
測定開始条件？
LED点灯パルス幅および走査回数の設定値を設定値テーブルから読み込む
投光用LEDアレイをLED点灯パルス幅の設定値に応じて点灯させる
CCD駆動制御信号の出力間隔を走査回数の設定値に応じて変更する
測定終了条件？

Machine Translation

Japanese Patent – 08-287176

[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention relates to the bar code reader which used the image sensor (image sensor).
[0002]
[Description of the Prior Art]In the bar code reader using an image sensor, it irradiates with light simultaneously over the other end from one end of the bar code which serves as a measuring object, for example by an LED (light emitting diode) array, The catoptric light is simultaneously received for example, with a CCD (charge coupled device) image sensor, it changes into an electrical signal, and bar code information is read by evaluating and analyzing the electrical signal. Such reading operation is repeatedly performed until a predetermined terminating condition is fulfilled. Hereafter, one reading operation is called one scan.
[0003]Processing speed becomes quick, so that the frequency (scanning frequency per unit time) of reading operation is high. Since the time when image formation of the bar code is carried out to an image sensor is in inverse proportion to the scanning frequency per unit time on the other hand, the light income obtained for every scan decreases, so that the scanning frequency per unit time increases, and a read rate (the number of times whose reading to the number of times of reading operation was completed comparatively) becomes low. The scanning frequency per this unit time is appointed fixed by the hardware constitutions of each bar code reader.
[0004]
[Problem(s) to be Solved by the Invention]Generally, in the bar code reader using an image sensor, since light is simultaneously irradiated over the whole bar code and this catoptric light is received between predetermined time, if a bar code moves during measurement, bar code information cannot be read correctly. Therefore, in order to read bar code information correctly using such a bar code reader, it is necessary to make the object to which the barcode label was given stand it still as much as possible.
[0005]However, in the factory line of a factory, etc., it is requested that the bar code given to the object which moves is correctly measured with the small bar code reader using an image sensor. Then, the method of measuring the bar code which moves when only the time width in which a bar code is shorter than the time by which image formation is carried out to an image sensor carries out pulse lighting of the LED is proposed.
[0006]In this case, the influence of movement of a bar code decreases, so that the lighting times of LED are short. Since the quantity of the light irradiated on a bar code decreases on the other hand, a read rate falls. Then, the lighting times of LED are provided in the suitable value fixed by hardware constitutions according to the purpose of using each bar code reader.

[0007]However, the best scanning frequency and the lighting times of LED change with operating conditions used as a measuring object, such as existence of movement of a bar code, movement speed of a bar code, and measurement distance. Therefore, the user is wanted to be able to read bar code information by the best operating state according to an operating condition.
[0008]The purpose of this invention is to provide the bar code reader which can read bar code information by the best operating state according to an operating condition.
[0009]
[Means for Solving the Problem]
(1) A bar code reader concerning the 1st invention invention of the 1st is provided with a light projection means, an image sensor, a binarization means, an analysis means, a clock frequency setting-out means, and a control means.
[0010]A light projection means irradiates a bar code used as a read object. An image sensor receives catoptric light from a bar code with which light was irradiated by light projection means, and changes it into an electrical signal. A binarization means changes into binarization data an electrical signal outputted from an image sensor. An analysis means analyzes binarization data obtained by a binarization means, and reads bar code information. A clock frequency setting-out means sets up clock frequency of an image sensor arbitrarily beforehand. A control means drives an image sensor with clock frequency set up by a clock frequency setting-out means.
[0011](2) A bar code reader concerning the 2nd invention invention of the 2nd is provided with a light projection means, an image sensor, a binarization means, an analysis means, a clock frequency setting-out means, and a control means.
[0012]A light projection means irradiates a bar code used as a read object. An image sensor receives catoptric light from a bar code with which light was irradiated by light projection means, and changes it into an electrical signal. A binarization means changes into binarization data an electrical signal outputted from an image sensor. An analysis means analyzes binarization data obtained by a binarization means, and reads bar code information. A clock frequency setting-out means sets up the 1st clock frequency of an image sensor arbitrarily beforehand. A control means drives an image sensor with the 2nd predetermined clock frequency more than the 1st clock frequency before measurement, and changes clock frequency of an image sensor to the 1st clock frequency set up by a clock frequency setting-out means after a measurement start.
[0013](3) A bar code reader concerning the 3rd invention invention of the 3rd is provided with a light projection means, an image sensor, a binarization means, an analysis means, an irradiation time setting-out means, and a control means.
[0014]A light projection means irradiates a bar code used as a read object. An image sensor receives catoptric light from a bar code with which light was irradiated by light projection means, and changes it into an electrical signal. A binarization means changes into binarization data an electrical signal outputted from an image sensor. An analysis means analyzes binarization data obtained by a binarization means, and reads bar code information. An irradiation time setting-out means sets up beforehand time of an optical exposure by a light projection

means arbitrarily. A control means performs an optical exposure by a light projection means for every reading operation during time set up by an irradiation time setting-out means while it repeats reading operation by image sensor, binarization means, and an analysis means and performs it.
[0015]
[Function]In the bar code reader concerning the 1st - the 3rd invention, light is irradiated by the bar code used as a read object, and the catoptric light is received, it is changed into an electrical signal, and an electrical signal is further changed into binarization data. And binarization data is analyzed and bar code information is read. This reading operation is repeatedly performed until a predetermined terminating condition is fulfilled.
[0016]In the bar code reader especially applied to the 1st invention, the clock frequency of an image sensor can be beforehand set up arbitrarily by a clock frequency setting-out means. This drives during measurement with the clock frequency to which the image sensor was set. Therefore, a user becomes possible [adjusting the clock frequency of an image sensor so that reading of bar code information can be performed in the best operating state according to an operating condition].
[0017]In the bar code reader concerning the 2nd invention, While being able to set up the 1st clock frequency of an image sensor arbitrarily by a clock frequency setting-out means, before measurement, an image sensor drives with the 2nd clock frequency more than the 1st clock frequency, and it changes to the 1st clock frequency to which the clock frequency of the image sensor was set after the measurement start. Therefore, since it becomes possible to adjust the clock frequency of an image sensor so that reading of bar code information can be performed in the best operating state according to an operating condition, and the image sensor is driving the user with high clock frequency before the measurement start, The time from instructions of a measurement start to a measurement start becomes short, and measurement can be started promptly.
[0018]In the bar code reader concerning the 3rd invention, the time of the optical exposure by a light projection means can be beforehand set up arbitrarily by an irradiation time setting-out means. Thereby, light is irradiated for every reading operation by the bar code between the set-up time. Therefore, a user becomes possible [adjusting the time of the optical exposure to a bar code so that reading of bar code information can be performed in the best operating state according to an operating condition].
[0019]
[Example]Drawing 1 is a block diagram showing the composition of the bar code reader by one example of this invention. In drawing 1, LED drive circuit 1 for floodlighting, the binarization signal processing circuit 2, LED lighting circuit 3, the buzzer generation circuit 4, the control circuit 5 for CCD drives, CPU(central processing unit) 6, ROM(read-only memory) 7, and RAM(random access memory) 8, It is constituted by the one-chip microcomputer 9.
[0020]LED drive circuit 1 for floodlighting drives LED array 11 for floodlighting via the driver 10. The light emitted from LED array 11 for floodlighting is irradiated by the bar code 30 through the lens 12 for floodlighting. It is reflected by the mirror

14 through the lens 13 for light-receiving, and the catoptric light from the bar code 30 is received by CCD series 15. This CCD series 15 is driven by the control circuit 5 for CCD drives.

[0021]CCD series 15 changes into an electrical signal the light which received light. The electrical signal outputted from CCD series 15 is given to the binarization circuit 17 via the amplifier 16. The binarization circuit 17 changes the amplified electrical signal into a binarization signal. The binarization signal outputted from the binarization circuit 17 is incorporated into RAM8 one by one as binarization data by methods, such as DMA (Direct Memory Access). The binarization signal processing circuit 2 analyzes the binarization data memorized by RAM8 (decoding), and reads bar code information.

[0022]LED lighting circuit 3 makes the light switch on LED 18 and 19, in order to display the reading state of the bar code information by the binarization signal processing circuit 2. LED18 displays the existence of reading of bar code information. LED19 displays the stability of reading of bar code information. The buzzer generation circuit 4 sounds the buzzer 20, when bar code information is read by the binarization signal processing circuit 2.

[0023]CPU6 controls each part in the one-chip microcomputer 9 according to the control program stored in ROM7. In EEPROM (Electrically Erasable and Programmable Read Only Memory; electrically read-only memory which can be written [elimination /] in) 21. The scanning frequency per second (it is hereafter written as scanning frequency) and the preset value of LED lighting pulse width are saved as a setting value table. The communication circuit 22 transmits the reading result of the bar code information by the binarization signal processing circuit 2 to an external device while it receives various commands given from an external device and gives them to CPU6.

[0024]LED array 11 for floodlighting constitutes a light projection means, CCD series 15 constitutes an image sensor, and the binarization circuit 17 constitutes a binarization means from this example. The binarization signal processing circuit 2 constitutes an analysis means, EEPROM21 and the communication circuit 22 constitute a clock frequency setting-out means and an irradiation time setting-out means, and LED drive circuit 1 for floodlighting, control circuit 5 for CCD drives, and CPU6 constitutes a control means.

[0025]<u>Drawing 2</u> is a signal waveform diagram of each part in the bar code reader of <u>drawing 1</u>. In <u>drawing 2</u>, read-out gate pulse signal RG and CCD-clock-signals CK are given to CCD series 15 from the control circuit 5 for CCD drives as CCD drive control signal CD. LED lighting pulse signal LP gas is given to LED array 11 for floodlighting via the driver 10 from LED drive circuit 1 for floodlighting.

[0026]The pulse interval of read-out gate pulse signal RG serves as one scanning time, and the pulse width of LED lighting pulse signal LP gas serves as time of an optical exposure. At the time of non measurement, scanning frequency is set as a peak price and the scan time S0 is fixed to shortest time. Thereby, CCD series 15 drives with maximum operating frequency. At the time of non measurement, the pulse width W0 of LED lighting pulse signal LP gas is being fixed to the value defined beforehand.

[0027]If the trigger signal TR for measurement starts is given, measurement will be started at the time of generating of the next pulse of read-out gate pulse signal RG. At the time of measurement, the scan time S1 of read-out gate pulse signal RG and CCD-clock-signals CK and the pulse width (LED lighting pulse width) W1 of LED lighting pulse signal LP gas are changed into a preset value, respectively.
[0028]Thus, since CCD series 15 is driving with maximum operating frequency before the measurement start, the time from the input of the trigger signal TR to a measurement start serves as the shortest, and measurement is started promptly.
[0029]Next, the user set processing in the bar code reader of this example is explained, referring to the flow chart of drawing 3. First, it is judged whether the command is a scanning frequency setting command CPU6 as a command is inputted via the communication circuit 22 (Step S2). (Step S1) In the case of a scanning frequency setting command, the preset value of the scanning frequency inputted via the communication circuit 22 with a scanning frequency setting command is written in at the setting value table in RAM8 (Step S3).
[0030]When the inputted command is not a scanning frequency setting command, it is judged whether the command is an LED lighting pulse width setting command (step S4). In the case of an LED lighting pulse width setting command, the preset value of the LED lighting pulse width inputted via the communication circuit 22 with the LED lighting pulse width setting command is written in at the setting value table in RAM8 (Step S5).
[0031]When the inputted command is not an LED lighting pulse width setting command, it is judged whether the command is a save command (Step S6). In the case of a save command, each value of the setting value table in RAM8 is written in EEPROM21 (Step S7).
[0032]When the inputted commands are other commands, (Step S8) and processing corresponding to each command are performed (step S9). Thus, the preset value of scanning frequency and the preset value of LED lighting pulse width are saved as a setting value table EEPROM21.
[0033]Next, operation of usual operation in the bar code reader of this example is explained, referring to the flow chart of drawing 4. First, CPU6 reads the value of a setting value table into RAM8 from EEPROM21 (Step S10). The control circuit 5 for CCD drives drives CCD series 15 with maximum operating frequency (Step S11). And it stands by until predetermined measurement start conditions are fulfilled (Step S12). Here, predetermined measurement start conditions are that the trigger signal TR for measurement starts is given from the exterior, or a measurement start command is given via the communication circuit 22.
[0034]If measurement start conditions are fulfilled, CPU6 will read LED lighting pulse width and the preset value of scanning frequency from the setting value table in RAM8 (Step S13). Thereby, LED drive circuit 9 for floodlighting makes LED array 11 for floodlighting turn on according to the preset value of LED lighting pulse width via the driver 10 (Step S14). The control circuit 5 for CCD drives changes the output interval of CCD drive control signal CD according to the preset value of scanning frequency (Step S15).
[0035]Thus, Step S14 and the reading operation of S15 are repeated until

predetermined measuring finish conditions are fulfilled (Step S16). Here, predetermined measuring finish conditions are that the measuring finish command was given via that the bar code information same twice was read, for example or the communication circuit 22.
[0036]Thus, in the bar code reader of this example, Since scanning frequency and LED lighting pulse width can be set up arbitrarily, it becomes possible to adjust these values so that a user can do reading of bar code information in best processing speed and the best read rate according to an operating condition.
[0037]Since CCD series 15 is driving with maximum operating frequency before measurement, when the trigger signal TR for measurement starts is inputted, the reading operation of bar code information can be started by the scanning frequency and LED lighting pulse width which were set up promptly.
[0038]In the bar code reader of this example, since LED drive circuit 1 for floodlighting, the binarization signal processing circuit 2, LED lighting circuit 3, the buzzer generation circuit 4, and the control circuit 5 for CCD drives are built in in the one-chip microcomputer 9, a miniaturization is attained.
[0039]
[Effect of the Invention]In the 1st invention, the clock frequency of an image sensor can be arbitrarily set up by a clock frequency setting-out means. Therefore, according to an operating condition, bar code information can be read by the best operating state.

[0040]In the 2nd invention, the 1st clock frequency of an image sensor can be arbitrarily set up by a clock frequency setting-out means, and an image sensor drives with the 2nd clock frequency more than the 1st clock frequency before measurement, and it changes to the 1st clock frequency with which the clock frequency of the image sensor was set up after the measurement start. Therefore, while a user can read bar code information by the best operating state according to an operating condition, the time from instructions of a measurement start to a measurement start serves as the shortest, and measurement of a bar code can be started promptly.

[0041]In the 3rd invention, the time of the optical exposure to a bar code can be arbitrarily set up by an irradiation time setting-out means.
Therefore, according to an operating condition, bar code information can be read by the best operating state.

TECHNICAL FIELD
[Industrial Application]This invention relates to the bar code reader which used the image sensor (image sensor).

PRIOR ART
[Description of the Prior Art]In the bar code reader using an image sensor, it irradiates with light simultaneously over the other end from one end of the bar code which serves as a measuring object, for example by an LED (light emitting diode) array, The catoptric light is simultaneously received for example, with a

CCD (charge coupled device) image sensor, it changes into an electrical signal, and bar code information is read by evaluating and analyzing the electrical signal. Such reading operation is repeatedly performed until a predetermined terminating condition is fulfilled. Hereafter, one reading operation is called one scan.
[0003]Processing speed becomes quick, so that the frequency (scanning frequency per unit time) of reading operation is high. Since the time when image formation of the bar code is carried out to an image sensor is in inverse proportion to the scanning frequency per unit time on the other hand, the light income obtained for every scan decreases, so that the scanning frequency per unit time increases, and a read rate (the number of times whose reading to the number of times of reading operation was completed comparatively) becomes low. The scanning frequency per this unit time is appointed fixed by the hardware constitutions of each bar code reader.

EFFECT OF THE INVENTION

[Effect of the Invention]In the 1st invention, the clock frequency of an image sensor can be arbitrarily set up by a clock frequency setting-out means. Therefore, according to an operating condition, bar code information can be read by the best operating state.

[0040]In the 2nd invention, the 1st clock frequency of an image sensor can be arbitrarily set up by a clock frequency setting-out means, and an image sensor drives with the 2nd clock frequency more than the 1st clock frequency before measurement, and it changes to the 1st clock frequency with which the clock frequency of the image sensor was set up after the measurement start. Therefore, while a user can read bar code information by the best operating state according to an operating condition, the time from instructions of a measurement start to a measurement start serves as the shortest, and measurement of a bar code can be started promptly.

[0041]In the 3rd invention, the time of the optical exposure to a bar code can be arbitrarily set up by an irradiation time setting-out means.
Therefore, according to an operating condition, bar code information can be read by the best operating state.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]Generally, in the bar code reader using an image sensor, since light is simultaneously irradiated over the whole bar code and this catoptric light is received between predetermined time, if a bar code moves during measurement, bar code information cannot be read correctly. Therefore, in order to read bar code information correctly using such a bar code reader, it is necessary to make the object to which the barcode label was given stand it still as much as possible.
[0005]However, in the factory line of a factory, etc., it is requested that the bar code given to the object which moves is correctly measured with the small bar

code reader using an image sensor. Then, the method of measuring the bar code which moves when only the time width in which a bar code is shorter than the time by which image formation is carried out to an image sensor carries out pulse lighting of the LED is proposed.

[0006]In this case, the influence of movement of a bar code decreases, so that the lighting times of LED are short. Since the quantity of the light irradiated on a bar code decreases on the other hand, a read rate falls. Then, the lighting times of LED are provided in the suitable value fixed by hardware constitutions according to the purpose of using each bar code reader.

[0007]However, the best scanning frequency and the lighting times of LED change with operating conditions used as a measuring object, such as existence of movement of a bar code, movement speed of a bar code, and measurement distance. Therefore, the user is wanted to be able to read bar code information by the best operating state according to an operating condition.

[0008]The purpose of this invention is to provide the bar code reader which can read bar code information by the best operating state according to an operating condition.

MEANS

[Means for Solving the Problem]

(1) A bar code reader concerning the 1st invention invention of the 1st is provided with a light projection means, an image sensor, a binarization means, an analysis means, a clock frequency setting-out means, and a control means.

[0010]A light projection means irradiates a bar code used as a read object. An image sensor receives catoptric light from a bar code with which light was irradiated by light projection means, and changes it into an electrical signal. A binarization means changes into binarization data an electrical signal outputted from an image sensor. An analysis means analyzes binarization data obtained by a binarization means, and reads bar code information. A clock frequency setting-out means sets up clock frequency of an image sensor arbitrarily beforehand. A control means drives an image sensor with clock frequency set up by a clock frequency setting-out means.

[0011](2) A bar code reader concerning the 2nd invention invention of the 2nd is provided with a light projection means, an image sensor, a binarization means, an analysis means, a clock frequency setting-out means, and a control means.

[0012]A light projection means irradiates a bar code used as a read object. An image sensor receives catoptric light from a bar code with which light was irradiated by light projection means, and changes it into an electrical signal. A binarization means changes into binarization data an electrical signal outputted from an image sensor. An analysis means analyzes binarization data obtained by a binarization means, and reads bar code information. A clock frequency setting-out means sets up the 1st clock frequency of an image sensor arbitrarily beforehand. A control means drives an image sensor with the 2nd predetermined clock frequency more than the 1st clock frequency before measurement, and changes clock frequency of an image sensor to the 1st clock frequency set up by a clock frequency setting-out means after a measurement start.

[0013](3) A bar code reader concerning the 3rd invention invention of the 3rd is provided with a light projection means, an image sensor, a binarization means, an analysis means, an irradiation time setting-out means, and a control means.
[0014]A light projection means irradiates a bar code used as a read object. An image sensor receives catoptric light from a bar code with which light was irradiated by light projection means, and changes it into an electrical signal. A binarization means changes into binarization data an electrical signal outputted from an image sensor. An analysis means analyzes binarization data obtained by a binarization means, and reads bar code information. An irradiation time setting-out means sets up beforehand time of an optical exposure by a light projection means arbitrarily. A control means performs an optical exposure by a light projection means for every reading operation during time set up by an irradiation time setting-out means while it repeats reading operation by image sensor, binarization means, and an analysis means and performs it.

OPERATION

[Function]In the bar code reader concerning the 1st - the 3rd invention, light is irradiated by the bar code used as a read object, and the catoptric light is received, it is changed into an electrical signal, and an electrical signal is further changed into binarization data. And binarization data is analyzed and bar code information is read. This reading operation is repeatedly performed until a predetermined terminating condition is fulfilled.
[0016]In the bar code reader especially applied to the 1st invention, the clock frequency of an image sensor can be beforehand set up arbitrarily by a clock frequency setting-out means. This drives during measurement with the clock frequency to which the image sensor was set. Therefore, a user becomes possible [adjusting the clock frequency of an image sensor so that reading of bar code information can be performed in the best operating state according to an operating condition].
[0017]In the bar code reader concerning the 2nd invention, While being able to set up the 1st clock frequency of an image sensor arbitrarily by a clock frequency setting-out means, before measurement, an image sensor drives with the 2nd clock frequency more than the 1st clock frequency, and it changes to the 1st clock frequency to which the clock frequency of the image sensor was set after the measurement start. Therefore, since it becomes possible to adjust the clock frequency of an image sensor so that reading of bar code information can be performed in the best operating state according to an operating condition, and the image sensor is driving the user with high clock frequency before the measurement start, The time from instructions of a measurement start to a measurement start becomes short, and measurement can be started promptly.
[0018]In the bar code reader concerning the 3rd invention, the time of the optical exposure by a light projection means can be beforehand set up arbitrarily by an irradiation time setting-out means. Thereby, light is irradiated for every reading operation by the bar code between the set-up time. Therefore, a user becomes possible [adjusting the time of the optical exposure to a bar code so that reading of bar code information can be performed in the best operating state according to

an operating condition].

EXAMPLE

[Example]Drawing 1 is a block diagram showing the composition of the bar code reader by one example of this invention. In drawing 1, LED drive circuit 1 for floodlighting, the binarization signal processing circuit 2, LED lighting circuit 3, the buzzer generation circuit 4, the control circuit 5 for CCD drives, CPU(central processing unit) 6, ROM(read-only memory) 7, and RAM(random access memory) 8, It is constituted by the one-chip microcomputer 9.

[0020]LED drive circuit 1 for floodlighting drives LED array 11 for floodlighting via the driver 10. The light emitted from LED array 11 for floodlighting is irradiated by the bar code 30 through the lens 12 for floodlighting. It is reflected by the mirror 14 through the lens 13 for light-receiving, and the catoptric light from the bar code 30 is received by CCD series 15. This CCD series 15 is driven by the control circuit 5 for CCD drives.

[0021]CCD series 15 changes into an electrical signal the light which received light. The electrical signal outputted from CCD series 15 is given to the binarization circuit 17 via the amplifier 16. The binarization circuit 17 changes the amplified electrical signal into a binarization signal. The binarization signal outputted from the binarization circuit 17 is incorporated into RAM8 one by one as binarization data by methods, such as DMA (Direct Memory Access). The binarization signal processing circuit 2 analyzes the binarization data memorized by RAM8 (decoding), and reads bar code information.

[0022]LED lighting circuit 3 makes the light switch on LED 18 and 19, in order to display the reading state of the bar code information by the binarization signal processing circuit 2. LED18 displays the existence of reading of bar code information. LED19 displays the stability of reading of bar code information. The buzzer generation circuit 4 sounds the buzzer 20, when bar code information is read by the binarization signal processing circuit 2.

[0023]CPU6 controls each part in the one-chip microcomputer 9 according to the control program stored in ROM7. In EEPROM (Electrically Erasable and Programmable Read Only Memory; electrically read-only memory which can be written [elimination /] in) 21. The scanning frequency per second (it is hereafter written as scanning frequency) and the preset value of LED lighting pulse width are saved as a setting value table. The communication circuit 22 transmits the reading result of the bar code information by the binarization signal processing circuit 2 to an external device while it receives various commands given from an external device and gives them to CPU6.

[0024]LED array 11 for floodlighting constitutes a light projection means, CCD series 15 constitutes an image sensor, and the binarization circuit 17 constitutes a binarization means from this example. The binarization signal processing circuit 2 constitutes an analysis means, EEPROM21 and the communication circuit 22 constitute a clock frequency setting-out means and an irradiation time setting-out means, and LED drive circuit 1 for floodlighting, control circuit 5 for CCD drives, and CPU6 constitutes a control means.

[0025]Drawing 2 is a signal waveform diagram of each part in the bar code

reader of drawing 1. In drawing 2, read-out gate pulse signal RG and CCD-clock-signals CK are given to CCD series 15 from the control circuit 5 for CCD drives as CCD drive control signal CD. LED lighting pulse signal LP gas is given to LED array 11 for floodlighting via the driver 10 from LED drive circuit 1 for floodlighting.

[0026]The pulse interval of read-out gate pulse signal RG serves as one scanning time, and the pulse width of LED lighting pulse signal LP gas serves as time of an optical exposure. At the time of non measurement, scanning frequency is set as a peak price and the scan time S0 is fixed to shortest time. Thereby, CCD series 15 drives with maximum operating frequency. At the time of non measurement, the pulse width W0 of LED lighting pulse signal LP gas is being fixed to the value defined beforehand.

[0027]If the trigger signal TR for measurement starts is given, measurement will be started at the time of generating of the next pulse of read-out gate pulse signal RG. At the time of measurement, the scan time S1 of read-out gate pulse signal RG and CCD-clock-signals CK and the pulse width (LED lighting pulse width) W1 of LED lighting pulse signal LP gas are changed into a preset value, respectively.

[0028]Thus, since CCD series 15 is driving with maximum operating frequency before the measurement start, the time from the input of the trigger signal TR to a measurement start serves as the shortest, and measurement is started promptly.

[0029]Next, the user set processing in the bar code reader of this example is explained, referring to the flow chart of drawing 3. First, it is judged whether the command is a scanning frequency setting command CPU6 as a command is inputted via the communication circuit 22 (Step S2). (Step S1) In the case of a scanning frequency setting command, the preset value of the scanning frequency inputted via the communication circuit 22 with a scanning frequency setting command is written in at the setting value table in RAM8 (Step S3).

[0030]When the inputted command is not a scanning frequency setting command, it is judged whether the command is an LED lighting pulse width setting command (step S4). In the case of an LED lighting pulse width setting command, the preset value of the LED lighting pulse width inputted via the communication circuit 22 with the LED lighting pulse width setting command is written in at the setting value table in RAM8 (Step S5).

[0031]When the inputted command is not an LED lighting pulse width setting command, it is judged whether the command is a save command (Step S6). In the case of a save command, each value of the setting value table in RAM8 is written in EEPROM21 (Step S7).

[0032]When the inputted commands are other commands, (Step S8) and processing corresponding to each command are performed (step S9). Thus, the preset value of scanning frequency and the preset value of LED lighting pulse width are saved as a setting value table EEPROM21.

[0033]Next, operation of usual operation in the bar code reader of this example is explained, referring to the flow chart of drawing 4. First, CPU6 reads the value of a setting value table into RAM8 from EEPROM21 (Step S10). The control circuit 5 for CCD drives drives CCD series 15 with maximum operating frequency (Step

S11). And it stands by until predetermined measurement start conditions are fulfilled (Step S12). Here, predetermined measurement start conditions are that the trigger signal TR for measurement starts is given from the exterior, or a measurement start command is given via the communication circuit 22.
[0034]If measurement start conditions are fulfilled, CPU6 will read LED lighting pulse width and the preset value of scanning frequency from the setting value table in RAM8 (Step S13). Thereby, LED drive circuit 9 for floodlighting makes LED array 11 for floodlighting turn on according to the preset value of LED lighting pulse width via the driver 10 (Step S14). The control circuit 5 for CCD drives changes the output interval of CCD drive control signal CD according to the preset value of scanning frequency (Step S15).
[0035]Thus, Step S14 and the reading operation of S15 are repeated until predetermined measuring finish conditions are fulfilled (Step S16). Here, predetermined measuring finish conditions are that the measuring finish command was given via that the bar code information same twice was read, for example or the communication circuit 22.
[0036]Thus, in the bar code reader of this example, Since scanning frequency and LED lighting pulse width can be set up arbitrarily, it becomes possible to adjust these values so that a user can do reading of bar code information in best processing speed and the best read rate according to an operating condition.
[0037]Since CCD series 15 is driving with maximum operating frequency before measurement, when the trigger signal TR for measurement starts is inputted, the reading operation of bar code information can be started by the scanning frequency and LED lighting pulse width which were set up promptly.
[0038]In the bar code reader of this example, since LED drive circuit 1 for floodlighting, the binarization signal processing circuit 2, LED lighting circuit 3, the buzzer generation circuit 4, and the control circuit 5 for CCD drives are built in in the one-chip microcomputer 9, a miniaturization is attained.

DESCRIPTION OF DRAWINGS
[Brief Description of the Drawings]
[Drawing 1]It is a block diagram showing the composition of the bar code reader by one example of this invention.
[Drawing 2]It is a wave form chart of each part in the bar code reader of drawing 1.
[Drawing 3]It is a flow chart which shows the user set processing in the bar code reader of drawing 1.
[Drawing 4]It is a flow chart in the bar code reader of drawing 1 which usually shows the operation at the time of operation.
[Description of Notations]
1 The LED drive circuit for floodlighting
2 Binarization signal processing circuit
5 The control circuit for CCD drives
6 CPU
8 RAM
9 One-chip microcomputer

11 LED array
15 CCD series
17 Binarization circuit
21 EEPROM
22 Communication circuit
30 Bar code

[Claim(s)]
[Claim 1]A bar code reader comprising:
A light projection means which irradiates a bar code used as a read object.
An image sensor which receives catoptric light from a bar code with which light was irradiated by said light projection means, and is changed into an electrical signal.
A binarization means to change into binarization data an electrical signal outputted from said image sensor.
An analysis means to analyze binarization data obtained by said binarization means, and to read bar code information, a clock frequency setting-out means to set up clock frequency of said image sensor arbitrarily beforehand, and a control means that drives said image sensor with clock frequency set up by said clock frequency setting-out means.

[Claim 2]A bar code reader comprising:
A light projection means which irradiates a bar code used as a read object.
An image sensor which receives catoptric light from a bar code with which light was irradiated by said light projection means, and is changed into an electrical signal.
A binarization means to change into binarization data an electrical signal outputted from said image sensor.
An analysis means to analyze binarization data obtained by said binarization means, and to read bar code information, A clock frequency setting-out means to set up the 1st clock frequency of said image sensor arbitrarily beforehand, A control means which drives said image sensor before measurement with the 2nd predetermined clock frequency more than said 1st clock frequency, and changes clock frequency of said image sensor to said 1st clock frequency set up by said clock frequency setting-out means after a measurement start.

[Claim 3]A bar code reader comprising:
A light projection means which irradiates a bar code used as a read object.
An image sensor which receives catoptric light from a bar code with which light was irradiated by said light projection means, and is changed into an electrical signal.
A binarization means to change into binarization data an electrical signal outputted from said image sensor.
An analysis means to analyze binarization data obtained by said binarization means, and to read bar code information, While repeating reading operation by irradiation time setting-out means to set up beforehand time of an optical

exposure by said light projection means arbitrarily, said image sensor and said binarization means, and said analysis means and performing it, A control means which performs an optical exposure by said light projection means for every reading operation during time set up by said irradiation time setting-out means.